

CLAIMS

1. An optical transmitter for a WDM system having multiple WDM channels comprising:
- 5 a pump laser array of up to M pump lasers for producing respective pump beams;
- a M x N multiplexer having M inputs and N outputs, the M inputs being connected to receive the pump beams from respective ones of the pump lasers; and
- 10 a fiber laser array of up to N fiber lasers operable to emit at respective wavelengths  $\lambda_1, \lambda_2 \dots \lambda_N$  for respective ones of the multiple WDM channels, the N outputs of the multiplexer being connected to pump respective ones of the up to N fiber lasers.
2. A transmitter according to claim 1, wherein the multiplexer is configured so
- 15 that a pump beam received at any one of its M inputs is internally routed to all of its N outputs.
3. A transmitter according to claim 1, where N/M is equal to an integer power of two.
- 20 4. A transmitter according to claim 1, wherein the multiplexer has a configuration comprising a plurality of multiplexing locations where the pump beams are multiplexed, the configuration being such that no more than one half the total power of the pump beams can interact at any one of the multiplexing locations.
- 25 5. A transmitter according to claim 1, further comprising fiber couplers to provide the multiplexing locations.
6. An optical transmitter for a WDM system having multiple WDM channels comprising:
- 30 a pump laser array of up to M pump lasers for producing respective pump beams;

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5 a M x N multiplexer having M inputs and N outputs, the M inputs being connected to receive the pump beams from respective ones of the pump lasers, wherein the multiplexer is subdivided into a plurality of modules, wherein each module is decoupled from the other module or modules, and wherein each module is configured so that a pump beam received at any one of the inputs of the multiplexer associated with that module is internally routed to all of the outputs of that module; and

10 a fiber laser array of up to N fiber lasers operable to emit at respective wavelengths  $\lambda_1, \lambda_2 \dots \lambda_N$  for respective ones of the multiple WDM channels, the N outputs of the multiplexer being connected to pump respective ones of the up to N fiber lasers.

15 7. A transmitter according to claim 6, wherein the multiplexer is configured so that a pump beam received at any one of its M inputs is internally routed to all of its N outputs.

8. A transmitter according to claim 6, where N/M is equal to an integer power of two.

20 9. A transmitter according to claim 6, wherein the multiplexer has a configuration comprising a plurality of multiplexing locations where the pump beams are multiplexed, the configuration being such that no more than one half the total power of the pump beams can interact at any one of the multiplexing locations.

25 10. An optical transmitter for a WDM system having multiple WDM channels comprising:

a pump laser array of up to M pump lasers for producing respective pump beams;

30 a M x N multiplexer having M inputs and N outputs, the M inputs being connected to receive the pump beams from respective ones of the pump lasers;

a fiber laser array of up to N fiber lasers operable to emit at respective wavelengths  $\lambda_1, \lambda_2 \dots \lambda_N$  for respective ones of the multiple WDM channels, the N

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outputs of the multiplexer being connected to pump respective ones of the up to N fiber lasers; and

- 5 a power monitoring device arranged to measure power at a point in the transmitter after the multiplexer and a feedback control device connected to control the pump lasers responsive to the power measured by the power monitoring device.

11. A transmitter according to claim 10, wherein the power monitoring device is arranged to measure power at an input or output side of at least one of the fiber lasers.

- 10 12. An optical transmitter for a WDM system having multiple WDM channels comprising:

a pump laser array of up to M pump lasers for producing respective pump beams;

- 15 a M x N multiplexer having M inputs and N outputs, the M inputs being connected to receive the pump beams from respective ones of the pump lasers; and

an optical amplifier array of up to N optical amplifiers, the N outputs of the multiplexer being connected to pump respective ones of the up to N optical amplifiers, the optical amplifiers each having an input for receiving a signal to be amplified.

- 20 13. A transmitter according to claim 12, wherein the optical amplifiers include a section of optical fiber gain medium.

14. A transmitter according to claim 12, wherein the multiplexer is subdivided into a plurality of modules, and wherein each module is decoupled from the other module  
25 or modules, and wherein each module is configured so that a pump beam received at any one of the inputs of the multiplexer associated with that module is internally routed to all of the outputs of that module

15. A transmitter according to claim 12, further comprising a power monitoring  
30 device arranged to measure power at a point in the transmitter after the multiplexer, and a feedback control device connected to control the pump lasers responsive to the power measured by the power monitoring device.

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